

CLAIMS:

1. Bit detection method for detecting the bit values of bits of a channel data stream stored on a record carrier, wherein the channel data stream resides on an N-dimensional lattice of bits and comprises a plurality of contiguous bit units, each bit unit comprising at least one bit, wherein bit detection for the channel data stream is performed by
5 an iterative procedure, each iteration being carried out on the basis of said bit units, wherein the bit values of the bits of said bit units are detected by said iterative procedure based on the received HF signal values of the bits of said bit units, said method comprising:
- an initialisation step to obtain preliminary bit decisions for the bits of said bit units based on the HF signal values of said bits,
 - 10 - an updating step to update the bit values of the bits of said bit unit to be updated by searching for the bit values of each of the bits in said bit unit to be updated that best fulfil a predetermined criterion for said bit unit to be updated, said criterion being determined by the differences of the HF signal value and a reference HF signal value for each single bit of said bit unit to be updated, wherein said reference HF signal value is determined
15 by the bit value of said single bit in said bit unit to be updated and by the bit values of the neighbouring bits of said single bit, and
 - an iteration to iterate said updating step until a predetermined condition is fulfilled.
- 20 2. Method as claimed in claim 1,
wherein the bit values of said neighbouring bits, which are not part of said bit unit to be updated, are determined in a previous updating step of the iterative procedure, preferably the preceding updating step, and
wherein the bit values of the neighbouring bits, which are part of said bit unit to be updated,
25 are set to be equal to the corresponding bit values of each of the possible bit patterns that can be set up for said bit unit to be updated.
3. Method as claimed in claim 1,

wherein said preliminary bit decisions of said initialisation step are obtained by threshold detection using a slicer level.

4. Method as claimed in claim 1,

5 wherein said predetermined criterion to be fulfilled by a bit unit is determined by the sum over all the bits in said bit unit, said sum comprising the squared differences of the HF signal value and a reference HF signal value for each single bit of said bit unit.

5. Method as claimed in claim 1,

10 wherein said predetermined criterion to be fulfilled by a bit unit is determined by the sum over all the bits in said bit unit, said sum comprising the absolute values of the differences of the HF signal value and a reference HF signal value for each single bit of said bit unit.

6. Method as claimed in claim 1,

15 wherein said channel data stream comprises a one-dimensionally evolving bit sequence.

7. Method as claimed in claim 1,

wherein N is 3 yielding a three-dimensional lattice of bits.

20 8. Method as claimed in claim 1,

wherein N is 2 and said channel data stream comprises a channel strip of at least two bit rows one-dimensionally evolving along a first direction and aligned with each other along a second direction, said two directions constituting a two-dimensional lattice of bit positions.

25 9. Method as claimed in claim 6 or 8,

wherein said bit unit comprises one bit and wherein said reference HF signal value is determined by said one bit and its neighbouring bits, said neighbouring bits being determined in a previous updating step of the iterative procedure.

30 10. Method as claimed in claim 9,

wherein the bit value of the single bit of said bit unit is updated by a threshold operation using a slicer level set at half of the sum of a first reference HF-signal for the case said single bit would have bit value 0 and a second reference HF-signal for the case said single bit would have bit value 1.

11. Method as claimed in claim 8,
wherein the bits of said channel data stream are arranged on a two-dimensional hexagonal or square lattice.

5

12. Method as claimed in claim 8,
wherein said bit unit comprises two or three bits and wherein said reference HF signal value for each of said two or three bits is determined by said two or three bits and its respective neighbouring bits.

10

13. Method as claimed in claim 8,
wherein said channel strip comprises at least three bit rows and wherein in said initialization step said preliminary bit decisions for the bits of said bit unit are obtained by threshold detection, said threshold detection being performed in a predetermined sequence within a bit column comprising at least one bit of each bit row and being aligned in said second direction, wherein the outermost bits of said bit column are threshold detected first and the other bits of said bit column are threshold detected subsequently.

15

14. Method as claimed in claim 13,
wherein in said updating step of the iteration the bit values of the bits of said bit units to be updated are updated subsequently bit column by bit column for a number of bit columns defining a detection window, wherein the bit values of the bits of each bit column are updated in the same sequence as they have been threshold detected in said initialisation step.

20

15. Method as claimed in claim 13,
wherein in said updating step of the iteration the bit values of the bits of said bit units to be updated are updated in parallel for a number of bit columns.

25

16. Method as claimed in claim 1,
wherein at any possible step in the iterative procedure, additional to the bit decisions, reliability or soft-decision information is generated for the detected bits, said reliability or soft-decision information determining the probability that a bit has the binary value "0" or "1".

30

17. Bit detector for detecting the bit values of bits of a channel data stream stored on a record carrier, wherein the channel data stream resides on an N-dimensional lattice of bits and comprises a plurality of contiguous bit units, each bit unit comprising at least one bit, wherein bit detection for the channel data stream is performed by an iterative procedure, each iteration being carried out on the basis of said bit units, wherein the bit values of the bits of said bit units are detected by said iterative procedure based on the received HF signal values of the bits of said bit units, said bit detector comprising:

- an initialisation means for obtaining preliminary bit decisions for the bits of said bit unit based on the HF signal values of said bits,

- an updating means for updating the bit values of the bits of said update bit unit by searching for the bit values of each of the bits in said update bit unit that best fulfil a predetermined criterion for said update bit unit, said criterion being determined by the differences of the HF signal value and a reference HF signal value for each single bit of said update bit unit, wherein said reference HF signal value is determined by the bit values of said single bit in said update bit unit and by the bit values of the neighbouring bits of said single bit, and

- an iteration means for iterating said updating of said bit values until a predetermined condition is fulfilled.

18. Bit detector as claimed in claim 17, further comprising

- a first array of registers for storing subsequent HF-vectors comprising HF signal values for bits of different bit rows, and

- a second array of registers for storing the bit-vectors comprising bit values for bits of different bit rows,

wherein the bit detector unit is arranged between two subsequent registers of said second array, receiving as inputs the neighbouring bits obtained from the array of bit-vectors and the proper HF signal value obtained from the array of HF-vectors and outputting the updated bit value, and wherein the updated bit-value is stored in a subsequent register of said second array.

19. Bit detector as claimed in claim 18,

wherein said first array of registers is adapted for storing the HF-vectors in a register at each instant of the bit-clock and for transferring them at every M-th clock further to a set of registers of said second array.

20. Method of reproduction of a user data stream, which is error correction code encoded and modulation code encoded into a channel data stream and stored on a record carrier, comprising a bit detection method as claimed in claim 1 for detecting the bit values of bits of said channel data stream and a modulation code decoding method and an error correction code decoding method.

21. Reproduction device for reproduction of a user data stream, which is error correction code encoded and modulation code encoded into a channel data stream and stored on a record carrier, comprising a bit detector as claimed in claim 17 for detecting the bit values of bits of said channel data stream and a modulation code decoder and an error correction code decoder.

22. Computer program comprising program code means for causing a computer to perform the steps of the methods as claimed in claim 1 or 20 when said computer program is executed on a computer.